

What is claimed is:

- 1           1.     A method of cleaning a semiconductor device comprising the  
2 steps of :  
3           (i)     mixing HF and ozone water in a vessel to form a solution of HF  
4 and ozone water; and  
5           (ii)    dipping a semiconductor device in the vessel containing the  
6 solution of HF and ozone water,  
7                wherein the solution comprises about 0.034 to about 0.077 wt%  
8 HF.
- 1           2.     The method of claim 1, wherein the solution of HF and ozone  
2 water comprises about 0.035 to about 0.075 wt% HF.
- 1           3.     The method of claim 1, wherein the ozone water comprises  
2 about 5 to about 150 ppm ozone.
- 1           4.     The method of claim 3, wherein the ozone water comprises  
2 about 15 to about 30 ppm ozone.
- 1           5.     The method of claim 1, wherein in step (ii) the semiconductor  
2 device is dipped for a period between about 1 and about 30 minutes.
- 1           6.     The method of claim 5, wherein the semiconductor device is  
2 dipped for a period of about 15 minutes.
- 1           7.     The method of claim 1, whereby damaged layers and polymer  
2 residue are removed from the semiconductor device.

1           8.     A method of cleaning a semiconductor device comprising the  
2 steps of :  
3           (i)     mixing HF and ozone water in a vessel to form a solution of HF  
4 and ozone water;  
5           (ii)    dipping a semiconductor device in the vessel containing the  
6 solution of HF and ozone water, and thereafter  
7           (iii)   introducing ozone water into the vessel to replace the solution of  
8 HF and ozone water in the vessel,  
9                   wherein the solution comprises about 0.034 to about 0.077 wt%  
10 HF.

1           9.     The method of claim 8, wherein the solution of HF and ozone  
2 water comprises about 0.035 to about 0.075 wt% HF.

1           10.    The method of claim 8, wherein the ozone water comprises  
2 about 5 to about 150 ppm ozone.

1           11.    The method of claim 10, wherein the ozone water comprises  
2 about 15 to about 30 ppm ozone.

1           12.    The method of claim 8, wherein in step (ii) the semiconductor  
2 device is dipped for a period between about 1 and about 30 minutes.

1           13.    The method of claim 12, wherein the semiconductor device is  
2 dipped for a period of about 15 minutes.

1           14.    The method of claim 8, wherein in step (iii) ozone water is  
2 flowed into the vessel thereby causing an overflow of the solution of HF and  
3 ozone water out of the vessel.

1           15.    The method of claim 14, wherein the ozone water is flowed into  
2   the vessel thereby causing the overflow of the solution of HF and ozone  
3   water out of the vessel for a period between about 1 and about 30 minutes.

1           16.    The method of claim 15, wherein the period is about 20 minutes.

1           17.    The method of claim 8, whereby damaged layers and polymer  
2   residue are removed from the semiconductor device.

1           18.    A method of cleaning a semiconductor device comprising the  
2   steps of :

3           (i)     introducing HF and ozone water into a vessel to form a solution  
4   of HF and ozone water;

5           (ii)    mixing the HF and ozone water in the vessel to form a uniform  
6   solution of HF and ozone water; and

7           (iii)   dipping a semiconductor device in the vessel containing the  
8   uniform solution of HF and ozone water.

1           19.    The method of claim 18, wherein the solution comprises about  
2   0.034 to about 0.077 wt% HF.

1           20.    The method of claim 19, wherein the solution of HF and ozone  
2   water comprises about 0.035 to about 0.075 wt% HF.

1           21.    The method of claim 18, wherein the ozone water comprises  
2   about 5 to about 150 ppm ozone.

1           22.    The method of claim 21, wherein the ozone water comprises  
2   about 15 to about 30 ppm ozone.

1           23.    The method of claim 18, wherein in step (iii) the semiconductor  
2   device is dipped for a period between about 1 and about 30 minutes.

1           24.    The method of claim 23, wherein the semiconductor device is  
2   dipped for a period of about 15 minutes.

1           25.    The method of claim 18, wherein in step (ii) the HF and ozone  
2   water are mixed to form a uniform solution by circulation.

1           26.    The method of claim 25, wherein the HF and ozone water are  
2   circulated by a pump.

1           27.    The method of claim 26, wherein the HF and ozone water are  
2   circulated by flowing the HF and ozone water from an inner bath to an outer  
3   bath and pumped back into the inner bath.

1           28.    The method of claim 18, whereby damaged layers and polymer  
2   residue are removed from the semiconductor device.

1           29.    A method of cleaning a semiconductor device comprising the  
2   steps of:

3           (i)     introducing HF and ozone water into a vessel to form a solution  
4   of HF and ozone water;

5           (ii)    mixing the HF and ozone water in the vessel to form a uniform  
6   solution of HF and ozone water;

7           (iii)   dipping a semiconductor device in the vessel containing the  
8   uniform solution of HF and ozone water; and

9           (iv)    introducing ozone water into the vessel to replace the solution of  
10   HF and ozone water in the vessel.

1           30.    The method of claim 29, wherein the solution comprises about  
2   0.034 to about 0.077 wt% HF.

1           31.    The method of claim 30, wherein the solution of HF and ozone  
2   water comprises about 0.035 to about 0.075 wt% HF.

1           32. The method of claim 29, wherein the ozone water comprises  
2 about 5 to about 150 ppm ozone.

1           33. The method of claim 32, wherein the ozone water comprises  
2 about 15 to about 30 ppm ozone.

1           34 The method of claim 29, wherein in step (iii) the semiconductor  
2 device is dipped for a period between about 1 and about 30 minutes.

1           35. The method of claim 34, wherein the semiconductor device is  
2 dipped for a period of about 15 minutes.

1           36. The method of claim 29, wherein in step (iv) ozone water is  
2 flowed into the vessel thereby causing an overflow of the solution of HF and  
3 ozone water out of the vessel.

1           37. The method of claim 36, wherein the ozone water is flowed into  
2 the vessel thereby causing the overflow of the solution of HF and ozone  
3 water out of the vessel for a period between about 1 and about 30 minutes.

1           38. The method of claim 37, wherein the period is about 20 minutes.

1           39. The method of claim 29, wherein in step (ii) the HF and ozone  
2 water are mixed to form a uniform solution by circulation.

1           40. The method of claim 39, wherein the HF and ozone water are  
2 circulated by a pump.

1           41. The method of claim 40, wherein the HF and ozone water are  
2 circulated by flowing the HF and ozone water from an inner bath to an outer  
3 bath and pumped back into the inner bath.

- 1           42.    The method of claim 29, whereby damaged layers and polymer
- 2    residue are removed from the semiconductor device.

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